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AUTHOR Walter, Gerard G.
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ABSTRACT

This assessment of the outcomes of increased access to postsecondary education for hearing-impaired students focuses on attrition levels and earnings levels. To analyze attrition from postsecondary programs serving the deaf, information from 95 programs was gathered. Using an algorithm to estimate cohort survival rates and taking into account increased enrollments due to a rubella epidemic, attrition rates for deaf students were estimated to be about 70 percent of an entering class of hearing-impaired students, which was an average of one-third higher than rates reported for a comparable group of hearing students. Attrition rates were lowest for the group of postsecondary programs primarily offering diplomas and highest for those offering associate degrees. To analyze earnings levels, wage and salary data for hearing-impaired students who had graduated or withdrawn from the National Technical Institute for the Deaf were acquired from the Internal Revenue Service. The analysis showed that salaries increased with degree level. Recipients of sub-baccalaureate degrees earned 43 percent more than non-graduating students. Baccalaureate recipients earned salaries an average of 27 percent higher than recipients of sub-baccalaureate degrees, and 83 percent higher than the average earnings of withdrawals. (Author/JDD)

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Outcomes of Increased Access to Postsecondary Education by Deaf Persons

Gerard G. Walter

National Technical Institute for the Deaf

at

Rochester Institute of Technology

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American Deafness and Rehabilitation Association, Minneapolis, Minn.

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ABSTRACT

The impact of federal legislation and increased social acceptance of handicapped individuals has resulted in more hearing-impaired persons then ever before attending college. While college doors have been opened to the hearing-impaired, the question of whether students are able to graduate with a degree is one way of evaluating if colleges and universities are accommodating to the special needs of these persons. Research reported in this paper estimates that the rate of withdrawal from college is higher than 70 percent of an entering class, as compared to about 50 percent for entering hearing college students. Questions are raised about reasons for this high rate, especially in light of the impact college completion has on the potential lifetime earnings of an individual.

INTRODUCTION

The growth of postsecondary education since 1945 has been unprecedented in U.S. history. Returning World War II veterans, large numbers of whom might not otherwise have gone to college, entered universities and colleges from 1945 to 1950 in large part because of federal legislation commonly known as the "GI Bill." In the 1950's community colleges began to develop, opening college doors to large numbers of individuals who would not otherwise have had access to higher education.

During this same period the growth of higher education was fostered by changes in societal attitudes regarding college attendance. The launching of Sputnik, the goal to put a man on the moon, and the civil rights movement resulted in the emergence of concerns regarding access and choice. Access to postsecondary education and choice of school by individuals initially centered on the issue of college opportunities for children from families with low incomes and minorities. The passage of section 504 of the Rehabilitation Act of 1973, as amended in 1974, provided federal protection regarding access by handicapped individuals to higher education.

> No otherwise qualified handicapped individual in the United States...shall, solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program of activity receiving federal financial assistance.
>
> The United States Congress: Section 504 of the Rehabilitation Act of 1973. P.L. 93-112.[1]

The efforts of American society to provide access and choice in higher education has markedly influenced the numbers of hearing-impaired persons seeking postsecondary education. Enrollment of hearing-impaired persons in colleges has increased from approximately 250 in 1950 to more than 8000 in 1986 (Rawlings and King, 1986). This growth resulted from the baby boom after World War II, changes in societal attitudes toward providing

[1] *In its original version, Section 504 defined "handicapped individual" only with respect to employment. This was subsequently amended under the Rehabilitation Act Amendments of 1974 (P.L. 93-516) to include education.*

educational opportunities to people with disabilities, and at least two significant rubella epidemics during the same time period.[2]

The growth in enrollments of hearing-impaired students at colleges and universities indicates clearly that the issue of access is being addressed. However, it is not at all clear whether institutions have made adequate accommodations to meet the communicative and educational handicaps imposed by a severe to profound hearing impairment.

Depending on the severity of the hearing impairment, deaf students will have some unique difficulties being integrated into the social and academic mainstream of college life. Consider as examples the isolation of the hearing-impaired person who cannot hear a lecture, use a telephone, or interact with peers. Thus, while the hearing-impaired individual may meet all the minimal academic requirements for admission to college, we must question whether the environment has accommodated to the special needs of the handicapped individual in order to assure a reasonable chance of graduating.

With increased access, there will be a greater number of hearing-impaired persons graduating from postsecondary education and entering the labor force. The ability of these graduates to compete in the labor market is a way of evaluating the impact increased access to postsecondary education has had for deaf persons. Historically, deaf people have lagged behind their hearing counterparts in most major measures of work achievement. Studies throughout the century (Best, 1914, 1943; Martens, 1937; Lunde & Bigman, 1959; Schein & Delk, 1974; MacLeod-Gallinger, 1986) have shown that deaf persons are heavily overrepresented in less prestigious blue collar occupations, while earning substantially less than hearing workers (Wenrich, 1972; Schein & Delk, 1974). It has been well documented that, for hearing persons, completion of higher education results in graduates having less difficulty finding work, a more prestigious occupation, and a greater income (Jencks, et al., 1977; Mincer, 1975; Bowen, 1977; Taubman & Wales, 1974; Young, 1984).

For many decades, the small number of deaf persons completing postsecondary education has made this degree-career relationship a difficult

[2]*The epidemics occurred in 1957-59 and 1963-65. It is estimated that the 1963-65 epidemic resulted in more than 8,000 additional births of people with congenital hearing impairments.*

question to address. But, with the escalating enrollments of the past two decades, it is now possible to study the question of the effect of college on occupational characteristics of deaf persons.

The purpose of this paper then is to provide an initial assessment of the outcomes of this increased access to postsecondary education through analyses of two kinds of data: first, data about the level of attrition among hearing-impaired college students in the United States will be analyzed. Sufficient accommodation to the special needs of hearing-impaired persons should result in rates of withdrawal from college that are comparable to the rates for their hearing peers. In this sense, rate of withdrawal can be used as an index of accommodations being made to the special needs of hearing-impaired college students.

Second, the earnings of deaf alumni of the National Technical Institute for the Deaf will be analyzed as one indicator of success in the workplace. The higher the earnings the more prestigious generally is the job held by an individual. In this sense, difference in earnings between graduates and non graduates is a measure of the impact a college education has on an individual's ability to earn a living.

RESULTS

Attrition from postsecondary programs serving the deaf

The data for the attrition part of this study are from a survey of postsecondary programs for hearing-impaired students in North America conducted in the fall of 1985 by Gallaudet University and the National Technical Institute for the Deaf at the Rochester Institute of Technology (Rawlings, et al., 1986). Each college, university, or technical school known to have a specially designated program for hearing-impaired students was contacted and asked to complete a questionnaire. The questionnaire collected information about the program, the date the program was established, the accreditation of the program, special support services offered, size of hearing-impaired enrollments, total enrollment of the institution, number of graduates from the program, admission requirements, and majors of hearing-impaired students. Information was obtained from 145 progams serving hearing-impaired persons at the postsecondary level. The responding institutions represent a total enrollment of 7031 hearing-impaired students (5917 full-time and 1114 part-time) in colleges and universities in the U.S.

and Canada. Thirty-four states, the District of Columbia and Canada are represented by the responding programs.

Table 1. Mean enrollment statistics by type of degree most often granted for postsecondary programs for the deaf in the U.S.--1985 data.

DEGREE TYPE	NUMBER OF PROGRAMS	AVERAGE NUMBER OF STUDENTS					AVERAGE NUMBER OF UNDER-GRAD	AVERAGE NUMBER GRADUATING
		PREP	FRESH	SOPH	JUNIOR	SENIOR		
Diploma	46	14.2	20.5	19.2	2.0	2.9	58.8	8.7
Associate	27	15.9	16.7	11.4	.4	.4	44.8	3.8
Bachelor	22	13.3	40.1	13.3	11.7	10.3	88.7	7.8
Total	95	14.5	24.1	15.6	3.9	4.0	62.1	7.1

The data in Table 1 are average enrollment figures for 95[3] of the 145 institutions surveyed in 1985 for the book College and Career Programs for Deaf Students (Rawlings et al., 1986). For this study, programs were categorized by the type of degree most often granted in 1985. Thus, if a program granted both diploma and associate degrees, in 1985, but granted more diplomas than associate degrees, that program is categorized as a diploma-granting institution for purposes of this analysis. Graduates are defined as the reported number of diploma/certificates, associate and bachelor degrees granted in 1985. Overall, while the average size of the 95 programs reported in Table 1 is 62.1 students,[4] these same programs graduated an average of only 7.1 students in 1985. This is a rather low rate of graduation given the average size of enrollments.

Attrition is best evaluated by a method called cohort survival (Lyell and Toole, 1974). In this technique, a group of students entering an institution for the first time are tracked, and the survival rate to graduation for some given point in time after entering the institution is calculated.

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[3]Only programs established in 1980 or earlier were included in the analysis in order to provide stability of enrollment and graduation levels which might be variable in a newly established program.

[4]These figures included the large federally supported programs of Gallaudet University and the National Technical Institute for the Deaf at the Rochester Institute of Technology.

Ideally, knowing the cohort survival rates for the colleges represented in the book College and Career Programs for Deaf Students (Rawlings et al., 1986) would be the best way to measure attrition. Since such information is not reported, a model of cohort survival utilizing the data reported by the schools for the 1985 survey (Table 1) has been developed.

In order to approximate a cohort survival model, it is important to know the numbers of first year (new) students entering the educational system each year. Estimates for the numbers of new students were calculated in the following way: the assumption was made that institutions admit new students to both the preparatory and freshman classes, but that across all institutions some students in the freshman classes are actually in their second year of attendance and thus not new students. This assumption is based on experience from Gallaudet University and the National Technical Institute for the Deaf that about sixty percent of preparatory students continue to become freshmen. If this is the case then, for example, of the 24 freshmen reported for all programs in Table 1 eight (60 percent of 14.5) would be second year students and not new. Thus the estimated number of new students in the preparatory and freshmen classes would be given by the equation:

NEW STUDENTS = PREP + (FRESHMEN - (PREP X .60)).

Attrition rate can then be derived by application of the equation below:

ATTRITION RATE = (1 - (GRADUATES/NEW STUDENTS))

Applying this equation to programs educating deaf youth, however, will yield a rate of attrition that is inflated. This is because the number of persons graduating in 1985 entered, for the most part, before the increase in enrollments due to the rubella epidemic. To be accurate the graduates of 1985 must be compared with a cohort size entering at least five years prior to 1985. That is, the graduates of 1985 must be divided in the equation by the number of new students in 1980. It has been estimated that the number of new students in 1980 (a pre-rubella year) would be 20 to 40 percent less than in the rubella years (Stuckless and Walter, 1983). Using this assumption, it is necessary to reduce the number of new students in the equation to reflect the probable size of the cohort entering in 1980. In effect such an adjustment

would reduce the attrition rate for programs that have not shown an increase in students because of rubella, and thus make the model more conservative.

Since the effect of rubella on enrollments in all postsecondary programs is not exactly known, estimates of attrition using three assumptions: 0 percent increase due to rubella, 20 percent increase due to Rubella and 40 percent increase due to rubella are presented in Table 2. It can be observed

Table 2. **Estimated attrition rates for 95 postsecondary programs for the deaf by type of degree granted more often in 1985 using three assumptions about changes numbers of new students.**

DEGREE TYPE	ATTRITION RATES CHANGE IN NEW STUDENT NUMBERS		
	0%	20%	40%
DIPLOMA	67	59	45
ASSOCIATE	84	79	73
BACHELOR	83	79	71
OVERALL	76	70	61

that estimated attrition rates are lowest for the group of programs primarily offering diplomas and highest for those offering associate degrees. Under the assumption of an increase of 20 percent in student numbers due to the rubella epidemic about 59 percent of students entering programs offering primarily diplomas will withdraw while the estimate is 79 percent for the programs offering primarily associate degrees. Overall, depending on the assumption being made about the growth in numbers due to rubella, the estimated attrition rate is probably about 70 percent of an entering class of hearing-impaired students. While these figures appear to be high they must be compared to similar figures for hearing students. Data are summarized in Table 3 from a national study of student attrition by Beal and Noel (1980). It

can be observed that even for hearing college students there is considerable discrepancy in attrition rates among different types of schools. However, using even the most conservative assumption of a 40% increase in the size of the population entering college as a result of the rubella epidemic, the

Table 3. Student attrition rates in various types of of U.S. Colleges with Open or Liberal admission standards (Beal and Noel, 1980).

TYPE OF COLLEGE	ATTRITION (AFTER FIVE YEARS)
PRIVATE TWO YEAR	39%
PUBLIC TWO YEAR	58%
PRIVATE FOUR YEAR	43%
PUBLIC FOUR YEAR	48%

estimated rates for students at programs for the hearing-impaired exceed the national rates for hearing students.

Effect of college completion on earnings

As a result of negotiations with the Internal Revenue Service, Statistics of Income Division, a computer tape containing the social security numbers of 1928 hearing-impaired students who had graduated or withdrawn from NTID at RIT between 1968 and 1980 was sent to the IRS. Other variables also included on the tape were: year of graduation; sex; degree; and major. The social security numbers were matched against IRS files to extract Salaries and Wages reported on 1982 W2 forms for the 1928 individuals.

The type of information that could be obtained from the IRS was restricted by stringent confidentiality safeguards imposed by the IRS, and enforced by its Disclosures and Security Division. Only grouped data were provided and in such a fashion that individuals could not be identified--cells containing less than 3 subjects were collapsed. However, the IRS was able to provide a frequency distribution of wages and salaries earned in $5000 increments (Table 4) categorized by degree received from NTID[5]. The NO DEGREE category represents individuals who withdrew from NTID without completing a degree program[6], the SUB-BACCALAUREATE category

[5]*Other tables categorized by gender, time, from graduation, major in college and hearing status were also received from IRS.*

[6]*Research at NTID (MacLeod-Gallinger, 1986; Walter, MacLeod-Gallinger and Stuckless; 1987) indicates that students withdrawing earn about the same amount each year as deaf high school graduates not attending college. Since we do not have IRS data for deaf high school graduates who did not attend NTID, we will use the earnings of those withdrawing from NTID as a surrogate for the earnings of high school graduates not attending college.*

represents indivdiuals who received a Certificate, Diploma or Associate degree, and the BACHELOR category those who received the Bachelor degree. It must be noted that earnings are those reported as wages and salaries on individual W2 forms, and do not include income from other sources such as interest, consulting, self employment, and Supplemental Security Income.

Distributionally the data show that 64 percent of withdrawals earned less than $15,000 in 1982, while 61 percent of sub-baccalaureate recipients earn in the $5,000 - $20,000 range. The distribution for Bachelor degree graduates is dramatically different. Nearly 47 percent earn $15,000 - $25,000, and another 22 percent earn more than this amount.

The average earnings of the three groups show quite clearly that salaries increase with degree level. Recipients of sub-baccalaureate degrees earned 43 percent more than students who withdrew without graduating. Baccalaureate recipients earned salaries an average of 27 percent higher than recipients of sub-baccalaureate degrees, and a very substantial 83 percent higher than the average earnings of withdrawals. Clearly completion of a college degree substantially increases an individual's ability to earn a living.

CONCLUSIONS

Limitations

The results of the attrition analysis must be interpreted with caution since there were two transformations needed in order to estimate the attrition rates. In each instance a transformation was made, the reader will note that the effect was to reduce the calculated rate of attrition for hearing-impaired students. Even so, the rate of attrition is, on the average, one third higher than the rates reported for a comparable group of hearing students.

It must be kept in mind that success -- even when limited to success in the work place -- is a complex phenomenon. Important dimensions of success not addressed in this study include ease of finding employment, the nature of the work, and worker satisfaction with the job. The sole criterion of success used in this study is salaries and wages. While the significance of the earnings variable should not be minimized -- money is important to most people -- it must be clearly stated that it is not the only element of work success and certainly not to be equated with satisfaction.

Table 4. Sample of data received from the IRS.

WAGES & SALARIES		DEGREE EARNED		
		NO DEGREE	SUB-BACHELOR	BACHELOR
$1 - $4,999	N	177	80	13
	TOTAL	$325,313	$160,163	$29,996
$5,000 - $9,999	N	115	114	17
	TOTAL	$908,834	$944,529	$126,847
$10,000 - $14,999	N	153	224	21
	TOTAL	$1,887,749	$2,813,436	$270,742
$15,000 - $19,999	N	87	177	39
	TOTAL	$1,481,531	$3,070,708	$666,246
$20,000 - $24,999	N	46	94	38
	TOTAL	$1,035,561	$2,082,919	$880,886
$25,000 - $29,999	N	19	40	20
	TOTAL	$512,986	$1,068,071	$543,116
$30,000 - $34,999	N	4	8	7
	TOTAL	$132,065	$264,429	$225,806
$35,000 - $39,999	N	0	3	6
	TOTAL	0	$102,166	$223,009
$40,000 & OVER	N	0	0	4
	TOTAL	0	0	$188,867
OVERALL	N	601	740	165
	TOTAL	$6,284,039	$10,506,421	$3,115,515
MEAN		$10,456	$14,997	$19,124
STANDARD DEVIATION		$ 7,219	$ 6,787	$ 9,309

Summary of Findings

These results lead one to ask whether the rates of attrition for hearing-impaired students in postsecondary education programs are acceptable. This author suggests that the rates defined in this study must be substantiated through actual cohort survival analyses. If the results from such a study

support the current findings then two questions must be posed: why the rates are so high, and what can be done to reduce these rates of attrition? While it is beyond the scope of this paper to provide answers for these questions, the literature on attrition suggests a way of exploring these questions.

The theoretical model presented by Spady (1970), elaborated by Tinto (1975, 1987) and tested in various environments (Pascarella & Terenzini, 1979, 1980; Pascarella & Chapman 1983, Bean & Metzner 1985) provides an explanatory predictive theory of the persistence/withdrawal process that can be applied for use with deaf college students. The theory posited by Tinto (1975) is longitudinal and considers persistence, primarily, a function of the quality of a student's interactions with the academic and social systems of an institution. That is, students come to a particular institution with a range of background traits (e.g., achievement, communication, sex, social economic status, personality traits). These background traits influence, not only how the student will perform in college, but also how he/she will interact with, and subsequently become integrated into, an institution's social and academic systems. Other things being equal, the greater the student's level of social and academic integration, the more likely he or she is to continue at the particular institution.

For hearing-impaired students entering college there are a number of variables which may mitigate against their integration into these social and academic systems--most notably their communication and academic achievement skills--especially in the areas of math, science and reading.[7] Difficulties in these areas reduce a deaf person's ability to use traditional avenues of information transfer in college. While most programs surveyed in this study provide support services of interpreting and notetaking, these services, by themselves may not necessarily imporve the ability of hearing-impaired students to understand the content of a textbook or a lecture. The provision of lecture notes or sign language interpretation for lectures does not necessarily mean that the "achievement barrier" created by low reading and mathematics skills has been breached. It may be necessary to modify texts and instructional materials and provide a comprehensive battery of

[7]*For example, the Median reading grade equivalent for 17 year old hearing-impaired students is 3.2 on the Stanford Achievement Tests (Allen, 1986).*

compensatory and remedial programs to accommodate the needs of hearing-impaired deaf students.

In a similar fashion, the communication problems experienced by most hearing-impaired persons make it extremely difficult for them to take part in the usual social activities of campus life. Therefore, even though a hearing-impaired person has access to college, he/she may remain isolated both socially and educationally from the mainstream. Such isolation, or lack of integration into the educational community may be a cause of the high level of attrition of deaf persons attending college.

The relatively high level of attrition reported for deaf students is even more disturbing when one evaluates it in light of the reported effects of achieving some form of college certification. It would appear that the achievement of a degree from an institution of higher education has a significant influence on the earning power of the graduate. This is especially noteworthy when one considers the difference between the earnings of withdrawals and graduates, and that some of the withdrawals have subsequently completed some form of certification in higher education (this fact would inflate the salary of the withdrawn group). Walter, et al. (1987) indicates that over a lifetime (perhaps 40 years of earnings) these differences in income levels would result in significant personal benefits and returns to society through the payment of taxes.

It would appear, then, that considerable effort must be expended to reduce the apparently high attrition rates among deaf students attending college. The Work of Tinto (1987) indicates that choice of a college is not a decision that can be made lightly. The better the fit between the individual and the college in terms of academic, personal, social and occupational expectations, the higher the chance of an individual graduating from an institution. For deaf students other variables such as communication and available support services may be critical to success. Schere, Stinson and Walter (1987) and Foster (1986) have demonstrated the importance of adequate social experiences and availability of support services in students' decisions to withdraw from college. We should, then, attempt to apply the same clinical approach to a deaf person's choice of a college as we do when performing a hearing aid evaluation or in assessing their differential aptitudes in preparation for the job search process. This means

understanding fully the characteristics of both the individual and the institutions to which the individual is applying.

Only as more college graduates enter the labor market will the historical underemployment and reduced earnings described earlier in this paper begin to be reduced.

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